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ABSTRACT

The booklet, intended for physical and special educators, and occupational, physical, and recreation therapists, deals with physical fitness for handicapped students. Background information on the importance and attainment of fitness is followed by general principles of physical fitness development (such as overload, progression, specificity, and body composition). Modification in assessment measures for cardiorespiratory endurance, muscular strength and/or endurance, flexibility, and body composition are considered, as are health and safety procedures in testing. Fitness program implementation is discussed in terms of goals and objectives, organization, and special considerations for students with orthopedic impairments, sensory impairments, intellectual limitations, and emotional disturbances. Additional sections cover selection of appropriate activities, adaptation of equipment, and ways to sustain student interest. (CL)

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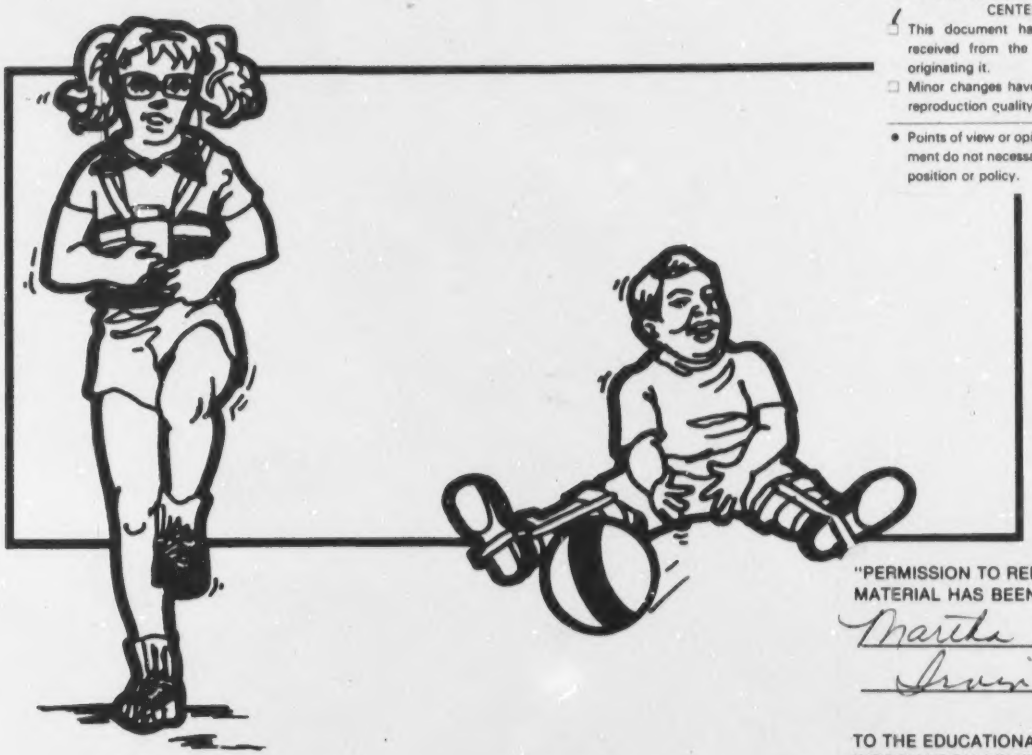

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TEACHER'S HELPER

PHYSICAL FITNESS FOR HANDICAPPED STUDENTS

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Teacher's Helper

Physical Fitness for Handicapped Students

In cooperation with
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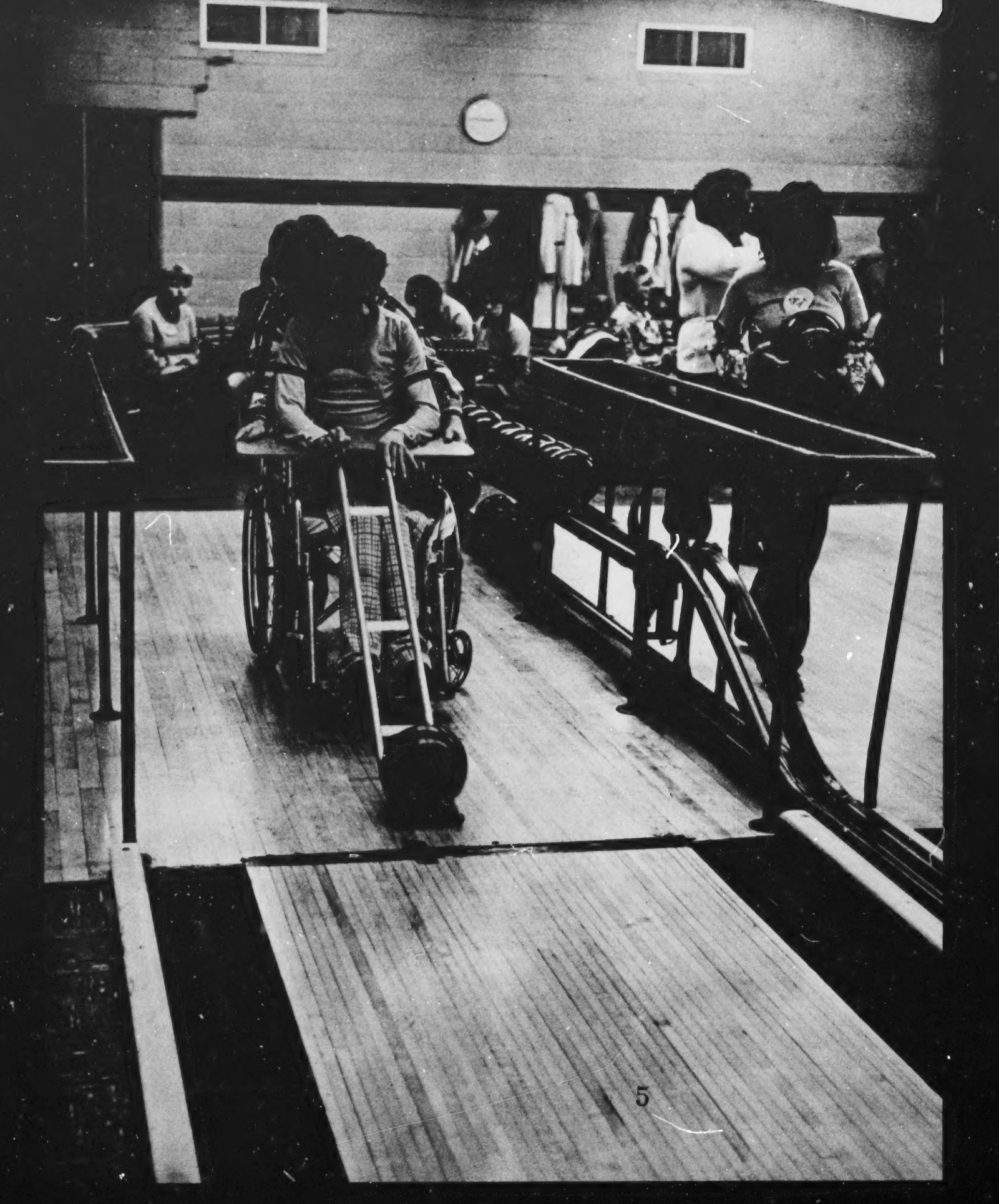


CONTENTS

INTRODUCTION TO PHYSICAL FITNESS 1

What Is Physical Fitness? 2
Why Is Physical Fitness Important? 2
When, Where and How Can Fitness Opportunities Be Provided 2
What Are the Components of Physical Fitness? 2
What Are Some General Principles of Physical Fitness Development? 3

ASSESSMENT OF FITNESS LEVELS 5

Modifications in the Assessment Process 5
Using Assessment Information 7
Health and Safety Precautions in Testing 8

IMPLEMENTING A PHYSICAL FITNESS PROGRAM 9

Establishing Goals and Objectives 9
Organizing a Fitness Program for Handicapped Children 10
Further Considerations for Selected Handicapped Children 13
Selecting Appropriate Activities 16
Adapting Equipment 17
Sustaining Interest 19

A FINAL NOTE 21

APPENDICES:

A. SELECTED FITNESS TESTS 22
B. GUIDE TO SELECTED PHYSICAL FITNESS ACTIVITIES 23
C. GENERAL GUIDE TO FITNESS ACTIVITIES FOR HANDICAPPED POPULATIONS 24
D. SELECTED SOURCES FOR SPECIAL PHYSICAL EDUCATION EQUIPMENT 26
E. REFERENCES 27

INTRODUCTION TO PHYSICAL FITNESS

Physical education services, including physical fitness activities, are essential for every handicapped student receiving an appropriate education. This booklet has been developed for physical educators, special education teachers, occupational therapists, recreation therapists, and physical therapists who work with handicapped students. It is designed to help these professionals recognize the need for improving the physical fitness level of their students and to provide them with tools, strategies, and information for improving their students' physical fitness capabilities for the tasks of daily living.

Physical education in many schools is programmed for physically fit youngsters, those who are able to pursue activities of daily living effectively and without fatigue. It is possible to be physically fit regardless of such limitations as orthopedic handicaps, mental retardation, or chronic health conditions. The human body adjusts to demands placed upon it. If a previously fit person becomes physically restricted through trauma or disease and becomes inactive, the previous level of fitness will quickly deteriorate. But if that same person engages in physical activity, within his/her level of competence, a level of physical fitness can be maintained which will permit a continuing active life.

Research has shown that large numbers of handicapped children are underfit, scoring in the low ranges on fitness tests. Many of these children are receiving inappropriate programming in physical education, and some receive none at all. Helping students develop and maintain an optimal level of physical fitness is one of the major purposes of physical education in the schools. Instruction in physical education is specifically included in the provisions for a free and appropriate education for all handicapped children, which is insured by the Education of All Handicapped Children Act, Public Law 94-142.

The Youth Fitness Council has recommended that all schools identify physically underdeveloped students and work to improve their physical capacity. The Committee on School Health of the American Academy of Pediatrics has urged physicians to recommend modifications in physical education programs rather than excuse students with special problems from physical education class. Both the National Education Association and the American Medical Association recognize that participation in appropriate physical activities contributes to the physical, mental, emotional, and social development of all children, including the handicapped child.

What Is Physical Fitness?

The American Alliance of Health, Physical Education, Recreation, and Dance (1980) has defined physical fitness in terms of a relationship between functional health and physical performance, with a range from severely limiting dysfunction to high levels of functional capacity. To be physically fit, it is important to maintain an active lifestyle to achieve and maintain low fat, high cardiorespiratory function, and sufficient muscular strength, muscular endurance, and flexibility. Activities to develop and maintain body strength and endurance should be included in physical education programs and are an important aspect of fitness programs.

Why Is Physical Fitness Important?

Physical fitness contributes greatly to a person's overall well-being, not only physically, but mentally, emotionally, and socially. Many handicapped children have poor self-images. Maximizing their fitness potential can contribute significantly to the achievement of confidence and positive self-concept.

Helping all students identify and develop their individual potential in motor performance is one of the major purposes of physical education and of athletics. Athletic participation is an integral part of physical education, and the components of fitness, speed, power, strength, endurance, and agility are important abilities needed to participate successfully in athletics.

When, Where, and How Can Fitness Opportunities Be Provided?

In many respects a program of fitness for the handicapped person is no different from that for any individual. After determining the present functional level of the handicapped student, appropriate activities should be selected. These activities may be performed through an individualized exercise program in which the student works at one or more stations on a scheduled basis, or they may be performed during the regular physical education class in which all students participate. Fitness objectives can also be incorporated into specific activities in the regular curriculum, such as swimming, jogging, weight lifting, aerobic dance, or gymnastics.

Much of the regular space and equipment used in regular physical education programs can be utilized with handicapped children with little or no modification.

What Are the Components of Physical Fitness?

The components of physical fitness as discussed in this booklet will be those recommended by the Task Force on Youth Fitness of the American Alliance for Health, Physical Education, Recreation, and Dance to develop the Health Related Physical Fitness Test. These components are:

- Cardiorespiratory Endurance
- Muscular Strength
- Muscular Endurance
- Flexibility
- Body Composition

What Are Some General Principles of Physical Fitness Development?

Research studies have shown that improvement in physical fitness occurs in response to programs of exercise based on known principles of development. It is important that teachers and therapists understand these principles in order to insure optimal physical fitness development. These principles include overload, progression, and specificity.

Principle of Overload. Physiological changes will occur when the muscles do more work per unit of time than is customary. Muscular strength will increase when muscles are exercised at higher than normal levels. Muscular endurance will improve when muscles perform work a greater number of times. The heart and lungs will operate more efficiently when exercise has placed increased demands on them. In order to increase flexibility, muscles must be stretched farther than they are accustomed to being stretched.

Principle of Progression. Exercise should begin at a low level and increase in intensity through a steady progression. The amount of exercise can be increased through intensity (how hard you work), frequency (how often you work), and/or duration (how long you work). A slow rate of progression will not only prevent injury during a developmental exercise program, but will also be more motivating for the individual engaging in the exercise.

Principle of Specificity. Specific types of activities will bring about specific types of results. Changes in physical fitness are limited to the muscles involved and the patterns of movements in which the muscles are used. Certain exercises will strengthen some muscles but not others. Exercises which strengthen may not increase endurance. Flexibility in joints must be accompanied by strength of muscles surrounding those joints to prevent injury. Because of specificity, careful planning must go into a fitness program so that each objective of the program is considered.

These principles serve as the basis for developing individual improvement programs. No two students begin at the same base level of fitness. Physical activity must be specifically planned for each individual based on assessment of present level of fitness and knowledge of the individual's state of health, physical limitations, and personal commitment to the physical fitness program.

An understanding of these components will aid the instructor in implementing an improvement program for students with a low level of physical fitness or students limited by orthopedic handicaps, sensory impairments, or health conditions. For further information on these components of physical fitness, the reader can consult **Fitness for Life** by Corbin and Lindsey, 1979, or any recent textbook on physical education or physiology.

Cardiorespiratory Endurance is the ability to exercise the entire body over an extended period of time. During cardiorespiratory exercise the heart rate is elevated for several minutes at a time and respiration is faster. The circulatory system (heart, arteries, veins, and blood) and the respiratory system (air passages and lungs) are stressed as the need increases to take in and utilize oxygen. Cardiovascular exercise strengthens the muscles of the heart and improves other parts of the cardiovascular system. Good cardiorespiratory fitness improves the individual's capacity to be active for longer periods of time without becoming tired and breathless.

Muscular Strength is the amount of force a group of muscles can exert. It is often measured by how much weight can be lifted. Strength of muscles helps determine how well people can jump, lift, push, and pull. The amount of strength which muscles can exert is related to factors of recent exercise, amount of stretch, motivation, and emotional state. Muscular strength is increased by requiring more work per unit of time than is customary. Good muscular strength helps reduce fatigue, maintain good posture, prevent muscular injury, and prevent some health problems, such as lower back pain.

Muscular Endurance is the ability to move muscles many times or to sustain muscular contraction over a period of time. Along with muscular strength and cardiorespiratory endurance, muscular endurance allows people to continue to work (exert effort) a long time. People who have good muscular endurance usually have good posture, resist fatigue, and are able to perform tasks of daily living which require sustained effort, such as carrying heavy packages long distances or riding a bicycle for a long time.

Flexibility is the ability of the joints to move through a full range of motion. It allows people to move freely without stiffness in their bodies. Muscles need to be stretched to keep them at their optimal length and flexibility. People with good flexibility are less likely to injure muscles in physical activity. Daily tasks of reaching and bending are made easier by good flexibility.

Body Composition refers to the relationship of muscle mass and body fat to total body weight. People who have a high percentage of fat usually have more health problems than those who are more lean. Work efficiency is reduced in a person who has a high ratio of fat to body mass. Other areas of fitness are usually affected by excess fat since the amount of exercise and movement is frequently limited, thereby decreasing muscular strength, endurance, and cardiorespiratory function. Body composition can be determined by skinfold tests or height, weight, and growth measurements.

ASSESSMENT OF FITNESS LEVELS

To determine the most beneficial fitness plan for each handicapped student, the instructor must assess the individual's initial fitness status in regard to each component of fitness. Instructors should select formal assessment tools appropriate for their students. The results of the testing may be used to determine the baseline level of fitness for appropriate placement in physical education classes, or remedial programs to identify strengths and weaknesses in fitness performance and to monitor and evaluate progress. Appendix A identifies some tests which may be useful and the fitness parameters they measure.

Modifications in the Assessment Process

Formal assessment tests cannot be used with all students. Orthopedic disabilities may preclude participation in a run, walk, standing, broad jump, or sit-up task. When a student's score falls in the lowest percentile on a test, it is difficult to recognize his/her strongest areas of performance or to form a baseline to record progress. The instructor may supplement formal assessment with criterion-referenced test items. These are test items which define a task in measurable terms. They should be designed so that some measure of success can be recorded. When post-testing after training, the same test criterion should be used. Some examples follow:

COMPONENT MEASURED: CARDIORESPIRATORY ENDURANCE

Task	Criterion
Step Test	Student will rise to an eight-inch step with both feet and return to the floor as many times as possible in one minute. Score number of times. Note: The height of the step or length of time may be changed to meet the individual's capacity.
Water Travel	Student will walk in the swimming pool from one side to the other as many times as possible in two minutes. Score the number of times distance is traveled. Note: Running or swimming may be substituted. The distance may be changed.
Floor Arm Sweeps	Student will lie on back and sweep both arms from side position to overhead position (as in Angels in the Snow) as many times as possible in one minute. Note: An object to touch overhead may make recording easier.

COMPONENT MEASURED: MUSCULAR STRENGTH AND/OR ENDURANCE

Task	Criterion
Modified Sit-Ups	While lying on back, student will raise head and shoulders off floor and hold as long as possible (one minute maximum). Note: Student can lie on an inclined surface with head higher than feet and perform sit-ups.
Modified Pull-Ups	While lying on back, student will raise head and upper back off floor by pulling on a bar placed arm's distance above head. Score length of time position is maintained (one minute maximum). Note: Substitute straight arm hang for pull-ups, or static hold in chin-up position, or bent-arm hold.
Modified Push-Ups	Student will assume straight arm prone support and maintain for measured time (one minute maximum). Note: Push-ups from bent-knee position may be substituted. Student will hold body in straight arm support position on the parallel bars for measured time (one minute maximum).
Modified Two-Hand Ball Throw	While sitting with back against wall and legs extended, student will throw a basketball with two hands as far as possible. Score the distance ball is thrown. Note: Substitute a playground ball or inflated beach ball if less weight is needed. May use chest pass or overhead throw.
Scooter Push-Off for Distance	While lying in prone position on a scooter, student will propel self as far as possible with one double arm push. Record distance. Note: May start on inclined ramp.

COMPONENT MEASURED: FLEXIBILITY

Task	Criterion
Sit and Reach	While sitting on floor with legs extended and feet against wall, student will reach forward as far as possible. Score the distance from wall to fingers. A lower score is desirable.

Wall Arm Extension	While sitting with back against wall and legs extended, student will raise both hands along wall as high as possible, keeping elbows on wall. Score the height from floor to fingertips.
Bend and Reach	While standing, student will bend forward and reach toward the floor. Score the distance from fingertips to floor. A lower score is desirable.
Leg Raise	While lying prone, student will raise one leg as high as possible to the vertical position, maintaining a straight leg. Score the distance from heel to floor. A higher score is desirable.

COMPONENT MEASURED: BODY COMPOSITION

Task	Criterion
Height-Weight Chart	After student is weighed and measured, refer to height-weight charts and plot percentile rank from standard scores for persons of the same age and sex.
Abdominal Measurement	Student will maintain normal standing or sitting position. With tape, measure girth one inch above navel. Record measurement.
Upper Arm Measurement	Student will hold arm straight and parallel to floor with palm up. Measure arm around largest part of upper arm. Record measurement.

Educators and medical personnel who serve children having specific handicaps are often aware of fitness needs associated with that particular disability. For example, students with degenerative diseases, such as multiple sclerosis, need strength training to enhance the remission status and decrease the severity of exacerbation stages (periods of disease). A wheelchair bound student will generally need flexibility training to prevent and relieve permanent muscle shortening (contractures), cardiorespiratory endurance training to maintain or improve aerobic capacity, and muscular strength/endurance training to prevent muscular atrophy.

To determine precisely the most beneficial fitness plan for each handicapped student, however, the instructor must assess the individual's initial fitness status in regard to each component of interest.

Using Assessment Information

The data collected from the assessment process should be grouped by fitness components to determine a pattern of strengths and weaknesses. Consideration should be given to the student's mental age, emotional state, motivational level and their influence on the results obtained. The instructor should decide whether the student's efforts were influenced due to attention factors, environmental factors, or daily fluctuations in behavior.

The more physically mature students will generally be taller and heavier than the less mature; however, there may not be significant differences for body size in strengthening activities such as push-ups or chin-ups. In other strength tasks, the more physically mature students are likely to show greater strength. Therefore, height and weight should be accounted for when comparing a student's test scores to norms. This is especially true if the student is not within the normal ranges for his or her age.

Overweight students may not be as physically mature as others in the same height-weight category and may appear weaker in comparison. The final consideration is body composition, or the relationship between muscle mass, fat, and total body weight.

Health and Safety Precautions in Testing

Some handicapped students who are not physically fit may react to fitness testing or activities by showing signs of discomfort or physiological stress. The instructor should be aware of those symptoms or conditions that indicate a need to modify the intensity of exercise. The following guidelines may be used to determine when testing or activities should be made less intense or stopped altogether.

The intensity of the testing or exercise should be decreased or terminated when any of the following symptoms appear:

Extended periods of breathlessness
Signs of unusual fatigue
Muscle twitching or shakiness
Headaches
Unusual pain
Severe pounding of the heart
Nausea or vomiting

The following are some of the conditions that may require medical consultation before testing is administered:

Hydrocephalus
Osteochondrosis (brittle bones)
Seizure history
Cardiac or kidney disease/conditions
Hemophilia
Leukemia
Degenerative diseases (muscular dystrophy, multiple sclerosis)
Arthritis
Diabetes
Pulmonary conditions (including asthma)
Acute illness
Post-surgical conditions

IMPLEMENTING A PHYSICAL FITNESS PROGRAM

Establishing Goals and Objectives

Before designing a detailed program to improve physical fitness, an instructor must have a clear picture of what he/she is trying to accomplish. The handicapped child's Individualized Education Program (IEP) will be developed following assessment. Adapted physical education goals and objectives, including fitness objectives, should be included in the IEP. A statement of long-term goals and short-term objectives will bridge the gap between assessment data and program activities. Long-term goals are general statements of what the instructor and student are trying to accomplish. Short-term objectives describe measurable steps against which progress can be monitored.

Some appropriate long-term goals relating to physical fitness are:

To increase the amount of participation in physical activity.

To increase the quality of participation in physical activity.

To improve muscular strength.

To improve muscular endurance.

To improve cardiorespiratory endurance.

To improve flexibility.

To improve the balance of body fat and muscle mass.

The goals selected will be determined by analysis of the data collected through formal and informal assessment and will be different for each individual. A person who walks with crutches might have good muscular strength but poor flexibility or cardiorespiratory endurance. Appropriate long-term goals would state these areas for improvement. A severely handicapped child who has not been exposed to a fitness program might need a general goal describing increased activity, as well as a goal describing need for improved muscular strength.

Short-term objectives should also be developed for each student. These are statements of how the individual will be able to perform during participation in the fitness program. Objectives should be sequenced to progress from simple tasks to those with increased resistance, repetitions, and/or speed.

Some appropriate short-term objectives are:

Student will be able to perform six sit-ups while lying on an inclined board, head raised six inches above feet, within one minute.

Student will be able to support body weight in bent-arm hand position for ten seconds.

Student will be able to propel self 200 yards in wheelchair without pausing to rest.

Student will be able to raise each leg to 90° flexion while lying on the floor.

Student will decrease arm girth by ¼ inch.

An important aspect of goal setting for the handicapped child is consultation with the interdisciplinary team. The physician, therapist, and/or school nurse may provide medical information which can help determine objectives. They may recommend exercises to strengthen existing functional patterns and abilities as well as exercises to maintain residual function of body parts with limited use.

Just as no two human bodies are alike, no single exercise program should be expected to meet the needs of all. When group workouts are scheduled, each individual should perform at his/her own rate and in a manner based on his/her own individual objectivies.

Organizing a Fitness Program for Handicapped Children

A variety of approaches may be used to organize a fitness program, depending upon the instructional needs of the handicapped children; the class size; and the materials, equipment, and space available. Three strategies for organization are presented here.

1. An individual exercise program can be devised so that a student works at one or more stations on a scheduled basis. For instance, at the sit-ups station, the student might do head-lifts, half sit-ups, or full sit-ups with feet held by partner.
2. At the beginning of or during the regular physical education class, exercises designed to meet the needs of the majority of the students are included as part of the instructional program. Each individual performs the exercise in such a way as to benefit himself/herself most. If the objective is flexibility of legs, each person will be stretching within his/her own capabilities, with the instructor monitoring rather than modeling.

3. Specific fitness activities can be incorporated into the regular physical education curriculum. Swimming, jogging, bicycle riding, weight lifting, aerobic dancing, or gymnastics can be prescribed and engaged in on a regular basis for maximum benefit.

In determining which approach to use, consideration should be given to the individual student's objectives, management of the student's time, use of space equipment, staff availability to monitor activity, and motivation of the student. The cooperation of the classroom teacher is needed to arrange suitable time in the student's busy schedule. Distractions of equipment and conflicting activity must be eliminated. Equipment must be suitable and available. Most important, the student must be motivated to participate and should find the experience pleasurable and satisfying.

The teaching/learning environment can be designed for safety and success by observing the following principles:

1. All exercise areas should be clearly defined with visual reference points such as tape markings on the floor, signs, partitions, or mats on the floor. Distractions should be eliminated, including casual traffic through the area, the simultaneous use of the room for other activities, and extraneous noise. Equipment not being used should be stored out of sight, if possible, and out of the path of traffic. Learning disabled, hyperactive, and emotionally disturbed students are more likely to be distracted by such equipment than are other children. Impediments to free-flowing traffic should be removed so that wheelchairs can move freely in the area. Tables or chairs that might be used for support by those with poor balance must be sturdy or braced against the wall. Weights which are not being used should be secured in a safe place.
2. Timing of the activities must be geared to the individual. The student's present functioning level may dictate a slower rate of performance. The hyperactive child will enjoy more successful participation from a series of short activities than from activities requiring his/her extended attention. The emotionally disturbed child may need extra time to change from one activity to another. Students in braces or who wear prosthetic devices require more time to move from station to station and to dress and shower.

11

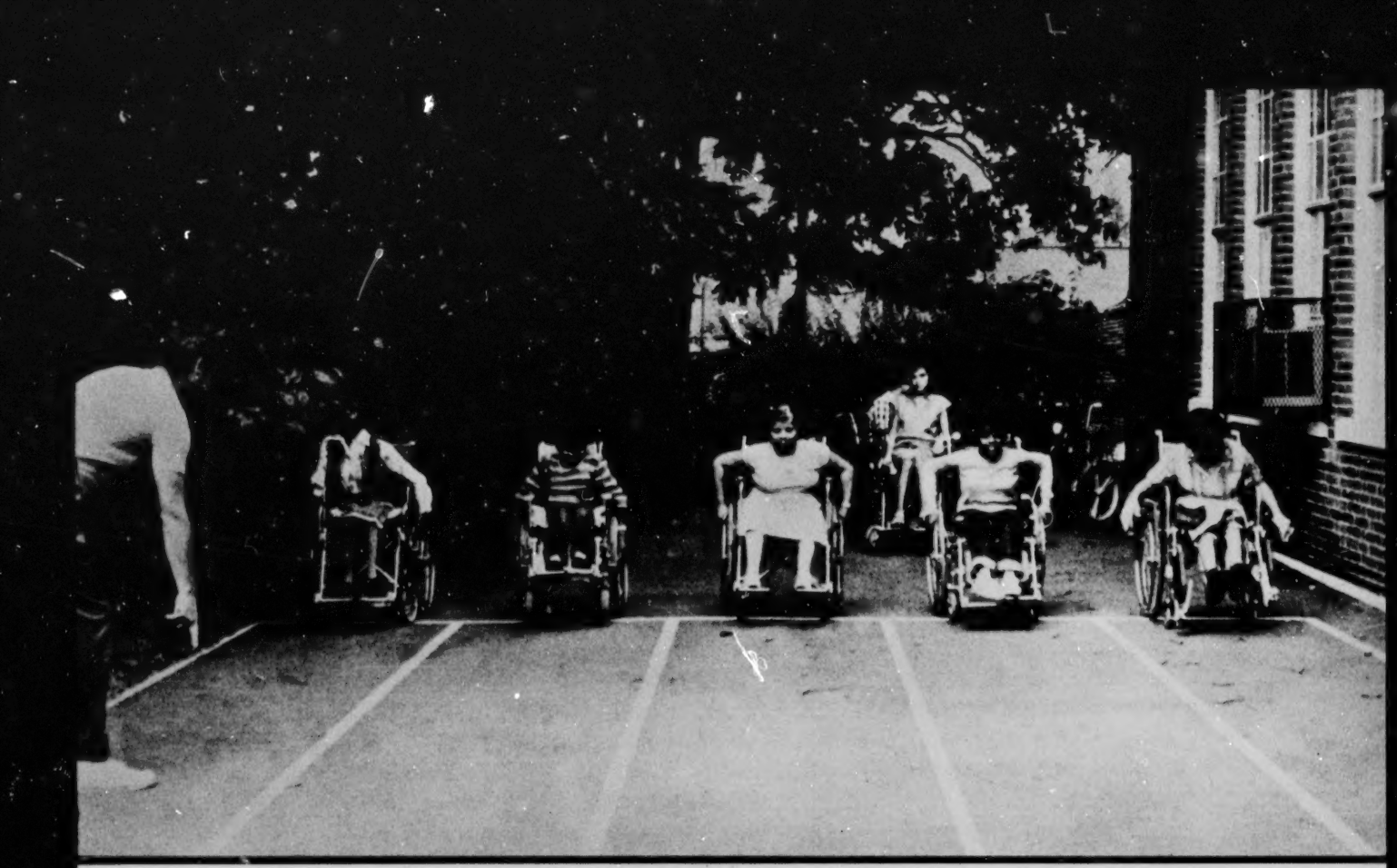
Students should not have to wait for long periods at stations or to use equipment, as delays may divert interest and create behavior problems. An established yet flexible routine which actively involves all students should be maintained.

3. The size of the instructional group is variable. Factors to consider in determining the size of the group include the space available, the attention span of the students, the rate of learning, the degree of independent functioning, and the selection of activities offered. The group should be small enough to allow the instructor to monitor all activities for safety.

   A small group is often preferable to a one-to-one situation, affording the opportunity for learning through socialization. Peer assistance can be provided, and relief from constant teacher observation is available. Combinations of instructional situations may be offered during the week.

4. Grouping of students may be based on similarity of need or similarity of handicapping condition. Consideration should be given to learning style, fitness level, functional level, and behavioral characteristics. Handicapped students should be placed with nonhandicapped peers whenever possible. There should be appropriate peer models to increase pleasure and motivation.

5. Monitors are necessary to avoid incorrect movement patterns. Some students can monitor their own activities through the use of mirrors plus occasional help from the instructor. Other students will benefit from assistance from nonhandicapped peers, volunteers from outside the classroom, or frequent teacher observations. Exercises must be performed correctly for improvement to occur. Equipment must be used as designed so that no injury occurs. The pace of the activity should be monitored for maximum physical benefit.



Further Considerations for Selected Handicapped Children

WHEELCHAIR BOUND AND ORTHOPEDICALLY IMPAIRED STUDENTS

Most students who are dependent on a wheelchair risk the development of adhesions and contractures of the muscles and other connective tissues surrounding the hip, knee, and ankle joints. Contractures, evidenced by a shortening of the flexor muscles to the extent that normal extension at the joint becomes difficult, can be prevented or relieved with flexibility and strength training. The student may already be engaging in flexibility training with a physical therapist. Consultation with the therapist is recommended for information on the needs of individual students. Active stretching immediately before physical activity not only reinforces the therapy but facilitates participation in the selected activity. A balance should be maintained between flexibility and strength training. If the knee flexors are being stretched, the extensors should be strengthened as well.

Wheelchair bound students may have a low level of cardiorespiratory endurance. When possible, students should exercise out of the chair and be free of assistive devices. Exercise to activate those parts of the body which are functional and can be performed on a mat for safety and comfort. Familiarity with each student's medical records and communication with relevant medical staff will help the instructor determine the best instructional approaches for each student.

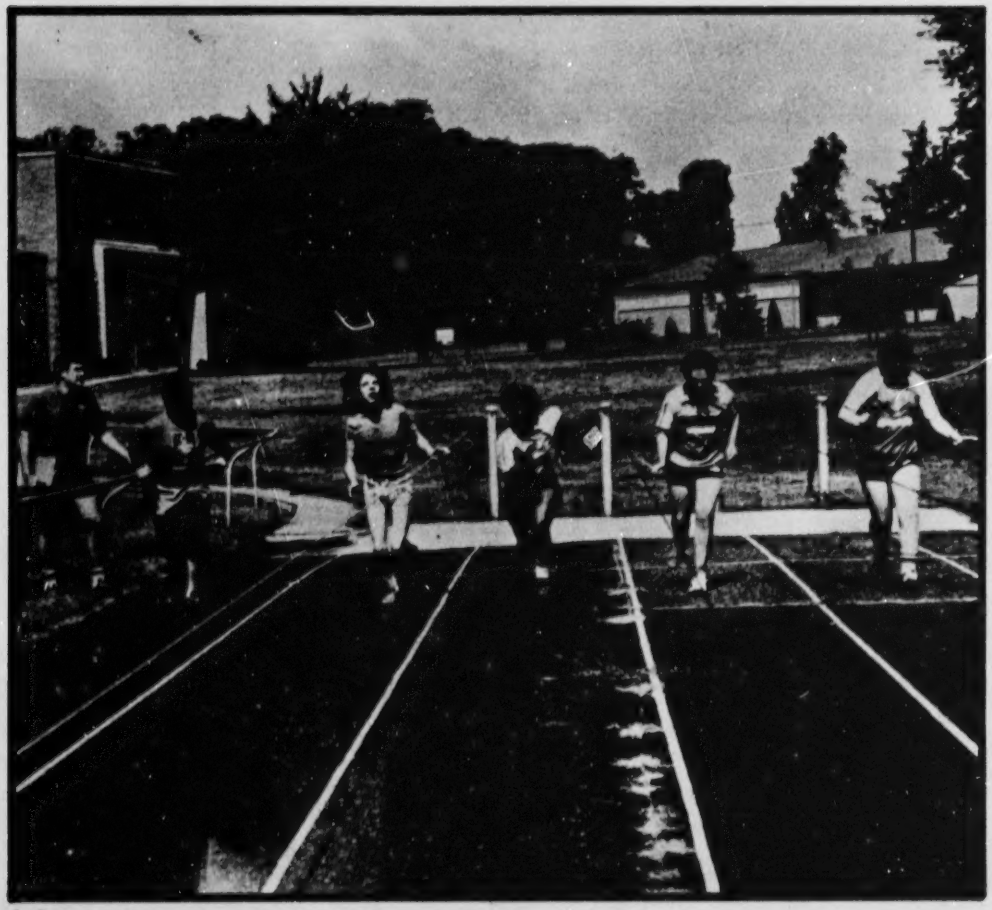
Extra time will be needed for transitions between physical activities, activity sessions, and other classes. Dressing and showering may take longer than for other students.

SENSORY IMPAIRED STUDENTS
(blind, visually impaired, deaf, hard of hearing, deaf-blind)

If the hearing or visually impaired student has no other impairments, very little modification is necessary to provide an adequate program. Tape recorded instructions, peer assistants, and kinesthetic teacher assistance will help the visually impaired student. Aerobic activities beneficial to visually impaired students are swimming, jumping rope, stationary bike riding, dancing, running, or jogging with a partner or guide rope.

Directions and demonstrations will need to be clear, concise, and concrete. The physical structure and organization of the room should be consistent. Equipment should always be in the same place with nonessential equipment stored in a safe place. A consistent routine of activity will help the student feel secure.

Increased use of visual, demonstrative, and manipulative techniques for skill presentations are effective for hearing impaired students. Some types of hearing loss are accompanied by balance disturbances and it is important to consult with medical personnel to get an understanding of the functional implications of the hearing impairments. Basic signing would be useful for those teachers working with hearing impaired students who use sign.



One of the dangers which a hearing impaired or visually impaired student faces in physical activity is that of injury when directions or warnings do not reach him/her in time to prevent an accident. Appropriate signaling should be established before an activity program is implemented. Using these signals, other students, as well as the instructor, should be able to communicate with the student.

INTELLECTUALLY LIMITED

In many cases intellectually limited students have normal or better than normal levels of physical fitness. Motivation becomes an important factor, for the student may not understand the implications of good physical fitness. Help from other students, progress charts, and frequent rewards will add positive feedback to the student.

The instructor should limit verbal instructions to simple words and sentences delivered in slow, even tones. In some cases, physical assistance may be required. It will be helpful to reinforce verbal directions with visual demonstrations. To ensure that the student understands the directions before beginning the activity, ask him/her to repeat the directions or show you what is expected. Teaching aids, such as charts, pictures, and film strips, will be helpful.

A regular format for instruction should be maintained with appropriate change in activities to compensate for short attention spans. Modify the equipment to suit the level of development and modify rules of games, shorten boundaries, and/or change the length of time for the task, as appropriate.

EMOTIONALLY DISTURBED STUDENTS

Familiarity with the student's attitude, interests, dislikes, and fears about physical activity can be the most useful strategy for working with emotionally disturbed students. It is impossible to predict behavior without a firm basis of knowledge of the individual. Until that basis is secure, it is necessary to keep close visual and verbal control of the student, to maintain an uncluttered area for activity with appropriate safety precautions, and to have other staff to call upon if needed. An informal discussion with the student about the program objectives and the student's expectations may help establish a trust relationship between instructor and student.

Some students will not tolerate any physical contact. The instructor should explain what he/she is about to do when it involves physical contact with the student. Frequently, the emotionally disturbed student will have a well developed avoidance technique which will be used when a task is threatening, fatiguing, or unfamiliar. It will help to build the student's self-confidence if he/she can realize success at the assigned tasks thereby reducing frustrations and the incidence of acting out behavior. Use techniques consistent with those used by the classroom teacher to interrupt this behavior until teacher/student rapport is established and new management strategies are tried.

Selecting Appropriate Activities

It is the responsibility of the instructor to select activities which will bring about the desired fitness changes for each student at his/her level of development. Appendix B provides a guide to selected physical fitness activities and the fitness components which may be useful to the reader. A general guide to fitness activities for handicapped populations is provided in Appendix C. In selecting appropriate activities, consideration should be given to the following:

- Activities should be based on developmental sequences of motor skills. The student should not be expected to perform a motor task for which he/she is not developmentally ready. A two-hand chest throw for distance may be a good activity for developing arm strength if the student has learned the preceding sequence of throwing so that correct motor patterns can be performed. Knowledge of motor development will help the instructor make these decisions.
- Activities should include a progression from simple to complex movements.
- Activities should be appropriate for the age and social maturity of the student. Children's tag games develop cardiorespiratory endurance, whether on foot, with assistive devices, or in wheelchairs, but need to be modified for teenagers so that language and motivation are age-appropriate.

When activities have been selected, the tasks should be analyzed to determine what skills are involved, what abilities are required, and what activity and equipment modifications will be needed. Task analysis will help in understanding the requirements for performing a task and in determining its appropriateness for given populations. An example follows:

Activity: Modified Basketball

Skills involved:
- Throwing
- Moving in space
- Moving at various speeds
- Catching

Abilities required:
- Eye-hand coordination
- Arm strength
- Agility
- Endurance

Possible modifications:
- Wheelchairs
- Scooters
- Auditory aids such as beep balls
- Lowered baskets
- Three zone courts

Children lacking the skills and abilities required for successful performance will require special aids or adjustments to complete the tasks with a feeling of achievement. If these adjustments are not practical, then an alternative activity, or a small part of the activity, would be appropriate.

Adapting Equipment

Special fitness programs do not require the purchase of new equipment. Some modifications can be made to standard physical education equipment to accommodate the needs of the special student. A small set of parallel or uneven bars can be lowered to waist height for use in weight bearing and arm strengthening exercises. Weight training equipment can be used by most individuals. Mats, portable ramps, treadmills, and stationary bicycles can all be used effectively to provide strengthening and endurance activities. With knowledge of the student's abilities and limitations, the equipment can be adjusted to provide the required amount of resistance or support.

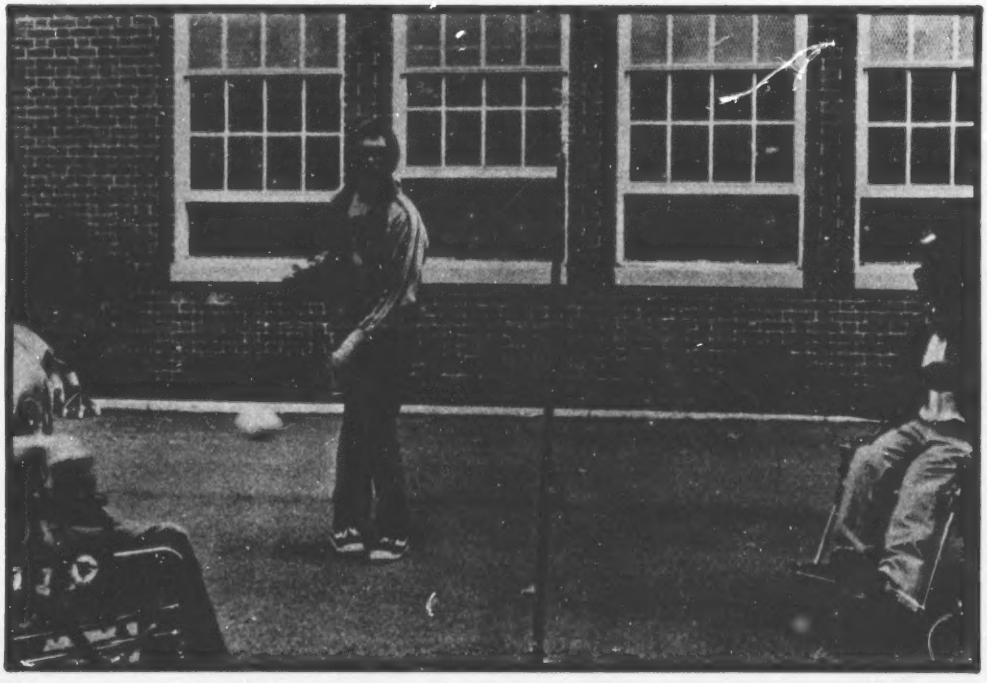
Small equipment commonly found in the gymnasium can add interest to routine exercises. Scooters can substitute for wheelchairs and crutches for some students. Balls can be filled with water for added resistance. An aid to the visually impaired is a battery-operated ball which emits an auditory signal. Games with such a ball can provide active play for those with limited vision. Visually impaired or blind students may benefit from a guide rope which goes from one end of a running area to the other. The student can hold this while running, or attach a snap hook to the rope and to a line held in hand. In this manner, running can be a part of the exercise program.

Consultation with a physical therapist may prove helpful when planning exercises for the physically handicapped child. A student with an adductor (scissors) gait may require a pillow or large ball between the knees when attempting leg extensions. This will keep the legs and hips in proper alignment. Students with lordosis (exaggerated inward curvature of the lower spine accompanied by forward tilted hips) may need a pillow or wedge placed under the knees when in a back lying position. Parallel bars may substitute for crutches or wheelchair for some activities.

The following list suggests equipment that may be used or modified for use. Creative thinking and imagination by the instructor will enlarge the list to suit the needs of the students.

Equipment Suitable for a Physical Fitness Program for Handicapped Children

EQUIPMENT	COMMENTS
Large Equipment	
Parallel Bars	Assists in walking and weight bearing for arm, shoulder strength.
Stationary Exercise Bicycle	Improves leg strength and cardiorespiratory endurance.
Trampoline	Increases body awareness and improves balance. Not recommended for students with spastic muscular contractures.
Treadmill	Provides walking experience for some students with limited ambulation.
Portable Ramp	Increases resistance in pushing wheelchair up the ramp. Provides impetus for scooter riding.
Weight Training Equipment	Improves strength of specific muscle groups. Should be used with supervision to prevent injury.
Small Equipment	
Auditory (Beep) Ball	Provides active games for visually impaired.
Bicycle Inner Tube	Provides resistance for increased muscular strength, when tubes are stretched.
Barbells and Weights	Improve strength of specific muscle groups. Use with close supervision.
Batting Tee	Allows batting practice for the visually impaired.
Cone	Marks boundaries for obstacle course.
Crawling Tunnel	Increases arm and shoulder strength in nonambulatory children.
Jump Rope	Improves leg strength and cardiorespiratory endurance. Can be placed at various heights.
Ladder	Develops arm and leg muscles. Place horizontally for walking and stepping exercise; place vertically for climbing activity.
Parachute	Provides an especially good cardiorespiratory activity for the visually impaired.
Pull Toy	Improves strength when toys are filled with heavy objects to provide extra weight.
Punching Bag	May be used while seated in wheelchair. Improves shoulder and arm strength.
Roller Skates	Improve balance and coordination.
Rope	Provides guideline for blind and visually impaired while running.
Sandbag	Provides added weight in strength training. May be made from plastic bottles.
Scooter	Develops arm, shoulder, and back strength.
Stuffed Animal	Improves strength when stuffing is replaced with sand for added weight.
Weighted Ball	Improves strength when ball is filled with water for added weight.
Weighted Cuff	Increases resistance for arm and leg exercise.



Sustaining Interest

Once students have been selected to participate in a fitness program, the instructor must develop strategies to maintain their interest and enthusiasm during training. This is true in the planning stage, the implementation process, and the evaluation of the program.

WHEN PLANNING THE PROGRAM, THE INSTRUCTOR CAN:

- Establish realistic objectives to prompt improvement or to minimize the risk of regression.
- Explain teacher expections and procedures to the student, his/her parents, and to other teachers.
- Relate fitness concepts to the student's level of understanding. The physically unfit child may have a low level of kinesthetic awareness and poor understanding of benefits to be derived from good physical fitness. Explain that muscles must be stressed to show improvement and that "breathlessness" is a normal response to stress. Allow time for the student to monitor internal information concerning what is happening during the activity.
- Encourage student participation by letting the student choose activities when appropriate. Related recreational activities and games are motivational and rewarding in themselves.
- Reinforce training through a variety of activities which produce the same results. A student who shirks a difficult exercise can benefit from a game. If improved arm strength is a goal, one activity could be push-ups, another might be playing cage ball.

WHEN IMPLEMENTING THE PROGRAM, THE INSTRUCTOR CAN:

- Operate on a no-fail system. If an objective is too difficult, establish sub-objectives for each step. Concentrate on fitness, not on learning new skills.
- Monitor the small steps, making sure that each trial is performed correctly. A student working with weights should employ correct posture and breathing techniques.
- Provide concurrent feedback using mirrors, video tape, and verbal comments.
- Vary the teaching techniques by including a variety of strategies ranging from corrective/rehabilitative exercises to self-testing discovery and exploratory techniques.
- Use a contract system based on a type of reinforcement that is effective for the student.
- Demonstrate a consistent, caring relationship with the student, regularly providing individual attention to his/her progress.
- Involve the student's friends, teachers, and family members in monitoring the student's progress. The support group should be reminded to keep the pressure positive but not overwhelming.
- Keep communication open. Be sensitive to the student's needs and comfort, but maintain control. An experienced, compassionate instructor is a good judge of when a task is too difficult. Frequent encouragement should be given to reduce student anxiety.

WHEN EVALUATING THE PROGRAM, THE INSTRUCTOR CAN:

- Provide periodic visual or tangible evidence of progress with charts showing daily or weekly gains. Awards can be given regularly or when pre-determined goals are reached.
- Reassess using the same criteria as at the beginning of the program. If progress is being made, establish new objectives for continuing improvement or for maintaining a level of fitness which has been achieved.
- Expect progress in small steps. Frequent checkups should be shared with the student as improvement becomes evident.
- Report your observations to the medical personnel who are involved with the student if adequate progress is not being observed over a period of time.

A FINAL NOTE

It is generally acknowledged that improved ability to function in everyday tasks, to engage in fulfilling physical recreation and sports, to feel better about one's physical capacities, and to improve the state of one's health are benefits of a high level of physical fitness. These benefits must also be made available to those special learners within the school system who have been identified as handicapped.

SELECTED FITNESS TESTS

TESTS	SOURCE	POPULATION	FITNESS COMPONENTS	NORMS
AAHPERD YOUTH FITNESS TEST	American Alliance for Health, Physical Education, Recreation, and Dance, 1900 Association Drive, Reston, VA 22091	boys and girls ages 9 - 17	arm and shoulder girdle strength, abdominal and hip flexor muscles, speed and agility, explosive muscular power, and cardiovascular efficiency	updated in 1975 on a national sample; percentile scores available.
LIFETIME HEALTH RELATED FITNESS TEST	The American Alliance for Health, Physical Education, Recreation, and Dance, 1900 Association Drive, Reston, VA 22091	youth ages 6 - 17	cardiorespiratory function, body composition, abdominal and low back-hamstring, musculoskeletal function	percentiles and discrete scores
MOTOR FITNESS TESTING MANUAL FOR THE MODERATELY MENTALLY RETARDED	The American Alliance for Health, Physical Education, Recreation, and Dance, 1900 Association Drive, Reston, VA 22091	moderately retarded children ages 6 - 20	arm-shoulder endurance, abdominal endurance, leg power, cardiorespiratory endurance, arm/shoulder power, flexibility	percentiles for moderately retarded children ages 6 - 20
MR. PEANUTS GUIDE TO PHYSICAL FITNESS	Standard Brands Education Service, P.O. Box 2695 Grand Central Station, New York, NY 10017	normal children ages 7 - 9	arm/shoulder strength, flexibility, abdominal strength and endurance, cardiorespiratory endurance	percentiles for children ages 7-9
PHYSICAL FITNESS TEST BATTERY FOR MENTALLY RETARDED CHILDREN	Hollis Fait, School of Physical Education, University of Connecticut, Storrs, CN 06268	moderately and mildly retarded children ages 9 - 20	arm/shoulder muscular endurance, leg/abdominal muscular endurance, cardiorespiratory endurance	low, average, and good performance scales for moderately and mildly retarded youth ages 9-20
PROJECT A.C.T.I.V.E. PHYSICAL FITNESS TEST BATTERY	Thomas M. Vodola, Township of Ocean School District, Oakhurst, NJ 07755	grades K-12	arm strength, abdominal strength, explosive leg strength, cardiorespiratory endurance	school age youth analyzed in conjunction with student's somatotype
PROJECT UNIQUE PHYSICAL FITNESS AND PERFORMANCE OF SENSORY AND ORTHOPEDICALLY IMPAIRED YOUTH	Joseph Winnick and John Silva, State University of New York, College at Brockport, Brockport, NY 14420	sensory and orthopedically handicapped children, ages 10 - 17	body composition, dynamic strength/endurance, flexibility, static and explosive muscular strength, cardiorespiratory function	sensory and orthopedically handicapped youth ages 10-17
YOUTH FITNESS TEST ADAPTATION FOR THE BLIND	The American Alliance for Health, Physical Education, Recreation, and Dance, 1900 Association Drive, Reston, VA 22091	not reported	arm/shoulder power, abdominal endurance, leg power, cardiorespiratory endurance	special norms designed for blind and partially sighted students ages 6-20 for running; regular norms for other items

For further information the reader is referred to Seaman and DePauw, The New Adapted Physical Education, and Practical Pointer Vol. 1, No. 9, Individual Education Programs: Assessment and Evaluation in Physical Education.

APPENDIX B

GUIDE TO SELECTED PHYSICAL FITNESS ACTIVITIES

Adapted from Corbin and Lindsey: Fitness for Life

	MUSCULAR STRENGTH	MUSCULAR ENDURANCE	FLEXIBILITY	CARDIO-RESPIRATORY ENDURANCE
Aerobic Dance			X	X
Archery	X			
Basketball		X		X
Bicycling	X	X		X
Canoeing or Sailing	X	X		
Calisthenics	X	X	X	X
Circuit Training		X	X	X
Dance			X	X
Gymnastics	X	x	x	
Hiking		X		X
Interval Training	X	X		X
Isometrics	X	X		
Jogging		X		X
Obstacle Course	X	X		
Rhythmics			X	X
Shuffleboard	X			
Skating (ice/roller)	X	X		X
Soccer		X		X
Swimming	X	X	X	X
Tetherball	X			
Volleyball		X		X
Walking		X		X
Weight Training	X	X		

GENERAL GUIDE TO FITNESS ACTIVITIES FOR HANDICAPPED POPULATIONS

Adapted from Corbin and Lindsey: Fitness for Life

X — Beneficial activity for most individuals in the group
MOD — Beneficial to most in group with modifications

ACTIVITY	HANDICAPPING CONDITION			
	ORTHOPEDICALLY IMPAIRED	INTELLECTUALLY LIMITED	OTHER HEALTH IMPAIRED	BLIND/ VISUALLY IMPAIRED
Aerobic Dance		X	MOD	X
Archery	X		X	
Basketball	MOD	X	MOD	MOD
Bicycling		X	MOD	
Canoeing or Sailing	MOD	X	X	X
Calisthenics	MOD	X	X	X
Circuit Training	MOD	X	X	MOD
Dance	MOD	X	MOD	X
Gymnastics	MOD	X	MOD	MOD
Hiking		X		X
Interval Training	MOD	X	MOD	X
Isometrics	X	X	X	X
Jogging	MOD	X	MOD	X
Obstacle Course	X	X	X	X
Rhythmics	X	X	X	X
Shuffleboard	X	X	X	X
Skating (ice/roller)	MOD	X	MOD	MOD
Soccer	MOD	MOD	MOD	
Swimming	X	X	X	X
Tetherball	X	X	X	
Volleyball	MOD	MOD	MOD	MOD
Walking	MOD	X	X	X
Weight Training	X	X	X	X

ACTIVITY	HANDICAPPING CONDITION			
	SPEECH IMPAIRED DEAF/HARD OF HEARING	DEAF/BLIND	SPECIFIC LEARNING DISABILITY	SERIOUSLY EMOTIONALLY DISTURBED
Aerobic Dance	X		X	
Archery	X		MOD	MOD
Basketball	X		MOD	MOD
Bicycling	X	MOD	X	X
Canoeing or Sailing	X	X	X	X
Calisthenics	X	X	X	X
Circuit Training	X		X	X
Dance	X		X	X
Gymnastics	X			
Hiking	X	X	X	X
Interval Training	X		X	X
Isometrics	X	X	X	X
Jogging	X	X	X	X
Obstacle Course	X	X	X	X
Rhythmics	X	X	X	X
Shuffleboard	X		X	X
Skating (ice/roller)	X		X	X
Soccer	X		MOD	MOD
Swimming	X	X	X	X
Tetherball	X		X	X
Volleyball	X		X	X
Walking	X	X	X	X
Weight Training	X	X	X	X

SELECTED SOURCES FOR SPECIAL PHYSICAL EDUCATION EQUIPMENT

Educational Activities, Inc.
P.O. Box 392
Freeport, New York 11520

Flaghouse, Inc.
18 W. 18th Street
New York, New York 10011

Mosier Materials
61329 Yakwahtin Court
Bend, Oregon 97701

Motor Development Corporation
P.O. Box 4054
Downey, California 90241

J.A. Preston Corporation
60 Page Road
Clifton, New Jersey 07012

Things from Bell, Inc.
4 Lincoln Avenue
P.O. Box 706
Cortland, New York 13045

Skill Development Equipment Company
A Division of AMPRO Corporation
P.O. Box 6300
Anaheim, California 92806-0300

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